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# The Competitive Game between Hot Money and Central Bank Monetary Policy

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**Abstract** – After the outbreak of U.S. Subprime Crisis in 2008, the outside hot money continued to pull into Chinese capital market. Combined with the appreciation of the RMB and the housing bubble in both stock and housing market, which made international short-term speculative capital went into Chinese market through a variety of informal tunnels, by the same time exacerbating the inflation, overflowing the liquidity and enhancing the high-level of CPI. While in the other side, Chinese Central Bank took actively monetary policy to respond to the hot money, through raising the deposit reserve ratio and interest rate to fight against with those unfriendly capitals. Therefore, how to find a point of balance between two game parts is the focus of this paper.

**Keywords** – Hot money; Monetary Policy; Game

## 1. Introduction

Hot money, also known as 'escape capital', is the circulating fund around the world with no particular purpose. The pursuit of the short-term speculative capital is for the highest paid and lowest risk in the international financial markets. When huge amount of hot money flows into a country, it will not leave until the capital and market down to the ground, which will lead to abnormal market turmoil in the country, even financial crisis.

Jiyun Wang, Zongxin Zhang (2008) pointed out that hot money has accounted for 3.6% of China's GDP in 2006 and it was estimated to a scale of 140 billion USD in 2007. According to the current flow-in speed, it would be a scale of 600-700 billion USD between year 2008 and 2009. Jiyun Han (2009) pointed out that under the stressful environment of U.S, economic slowdown and the appreciation of the RMB, the international speculative hot money had brought a tremendous potential threat to not only the regular operation of Chinese economy, but also the implement effect of Chinese monetary policy, which made the tight monetary policy difficult to reduce the inflation. At the same time, with the rising deposit reserve ratio, a lot of SMEs faced with high tension of operating capitals and Chinese economy was faced with the risk of a 'Hard Landing'.

## 2. The Analysis of China's Economic Situation and Monetary Policy

In the early 2010, the central bank raised the deposit reserve ratio twice while it also began to tight liquidity after note market putting about 700 billion RMB net capital into market. Faced with the pressure of inflation and the appreciation expectation of RMB, excess liquidity, asset price bubbles, an excessive amount of money supply widely occurred in the China economic market.

On the other hand, the currency authority emphasized on inflation on many occasions also made the public widely expected the implementation of interest rate hike policy. Since the first raising of deposit reserve ratio on 12nd of January, 2010, the market had a significant difference on the policy of monetary policy. While many people believed that the tightening of monetary policy signal had been an obvious case, the monetary authority still insisted that 2010 would continue to maintain a moderately loose monetary policy, the previous steady monetary policy could not meet the requirements of the current market.

## 3. The Competitive Game between Hot Money and Monetary Policy

China has a strong control over the capital and financial account of the balance of international payment, so the outside hot money mainly went through illegal tunnels into mainland of China. From the entry of overseas hot money flow (Figure 1), we can see interests and relationship of both hot money and central bank.

Hot money entered the mainland of China mainly through five ways. With the expected appreciation of RMB, hot money constantly looked for arbitrage opportunities within housing market, bond market, stock market and other markets, and meanwhile had an influence on the monetary policy of the central bank. The entering of the hot money accelerated China's inflation and the speed of CPI, which also led to false economic bubble in China. So, the mainly interest related are considered as two sides: hot money and central bank.

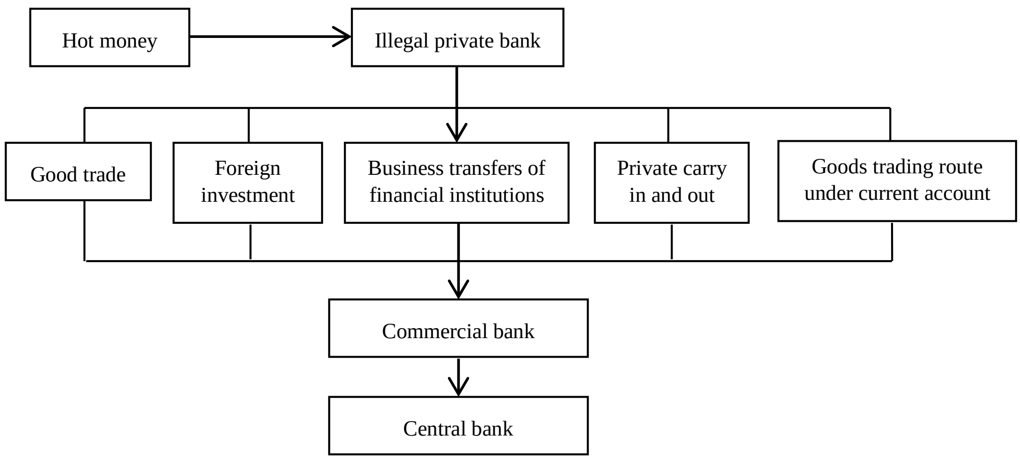


**Figure 1.** The Ways and Flow Chart of Hot Money Inflow

### 3.1. The Present Situation between Hot Money against Monetary Policy

According to the statistics, the hot money in China which the country could bear had exceeded the scale of the entire East Asian exposure before the 1997 Southeast Asian Financial Crisis, while the scale of China's GDP is only 1/4 of the Southeast Asia plus Korea's and Japan's. China Foreign Exchange Control Administration have been long pursuit of strict capital management, I thought that first of all, the reason why international hot money preferred Chinese market is that something related to the long-term expectation of RMB appreciation. Secondly, due to the 2008 U.S. Subprime Crisis, which made short-term market fluctuated largely, the hot money had the chance to go into emerging market to arbitrage. Thirdly, the appreciation of RMB made hot money pulled into China capital market and housing market. However on the Chinese authority side, regardless of the hot money's scale, the possibility of large-scale divestment is rather low. First, the RMB appreciation is expected to remain strong, and China can achieve benefit from it. Secondly, China is still in the channel of interest rate rising, the interest gap will be continue to stay large or more. Hot money will not leave China within the short period, which means large-scale capital outflow will not leave China within the short period.

Compared to the high-level scale of hot money, the China's monetary policy had raised deposit reserve ratio and benchmark interest rate. Since hot money injecting into Chinese market because of the U.S. Subprime Crisis, central bank had raised 14 times of deposit reserve ratio and 2 times of benchmark interest rate, which separately hit the new height of 20.5% and 5.81%. The competitive game between hot money and central bank monetary policy exacerbated the rate of inflation, which led CPI index rising too fast that normal life of people had been greatly affected. From the moderately loose monetary policy implemented by the central bank since late 2008, faced with complex domestic and international financial and economic environment, china's monetary policy had been affected by the foreign monetary policy, i.e. hot money inflows.

### 3.2. The Establishment of Game Theory Tree: Hot Money, Illegal Private Bank, Central Bank Monetary Policy

Figure 2 is the game between hot money and central bank monetary policy, illegal private bank works as a natural element(it has a probability of 1/2 to accept hot money to pass and 1/2 to reject it to pass), two parts are in the 'dynamic game of complete information'. Meanwhile, point A is the foreign hot money, point B is the illegal private bank which acts like a natural element, and point B is the central bank monetary policy. When point B making decisions, it doesn't know what exactly choice point A has made, so the information sets of point B changed from originally 2 sets to 4 sets, and each set has 2 decision nodes. 2 sets separately reflect central bank's two different decisions: if hot money A enters, whether it will increase interest rate or not; if hot money A doesn't enter, whether it will increase interest rate or not.

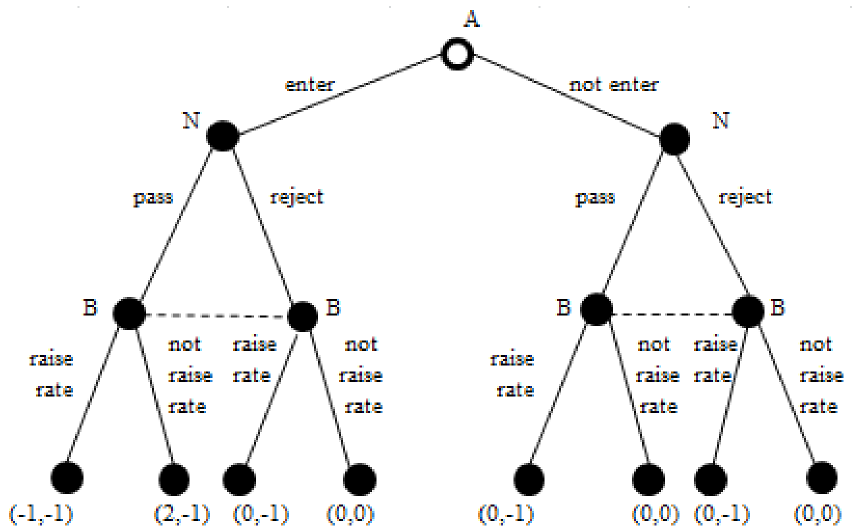


**Figure 2.** Hot Money Competes against Central Bank Monetary Policy (a)

Figure 2 gives reader a rough game concept between two parts, while figure 3 is aimed to find Kohiro Refined Nash Equilibrium.

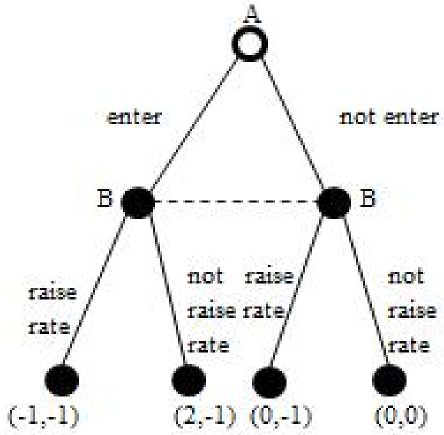


**Figure 3.** Hot Money Competes against Central Bank Monetary Policy (b)

**Table 1.** Hot Money Competes against Central Bank Monetary Policy: Strategies Description

| | | **Central bank monetary policy B** | | | |
|---|---|---|---|---|---|
| | | **{raise rate, raise rate}** | **{raise rate, not raise rate}** | **{not raise rate, raise rate}** | **{not raise rate, not raise rate}** |
| **Hot money A** | **Enter** | (-1,-1) | (-1,-1) | (2,-1) | (2,-1) |
| | **Not enter** | (0,-1) | (0,0) | (0,-1) | (0,0) |

From the strategic-typed statements, we find that this game has three pure strategies Nash Equilibrium, which are (enter, {raise interest rate, raise interest rate}), (enter, {raise interest rate, not raise interest rate}) and (not enter, {not raise interest rate, not raise interest rate}), each equilibrium is the optimal strategy when the other part strategy is given. While the reasonable Nash Equilibrium is (enter, {raise interest rate, not raise interest rate}), however from the point of payment view, two parts optimal choices are (not enter, {not raise interest rate, not raise interest rate}), i.e. Foreign hot money does not enter into China's market to make arbitrage while China remains mild inflation to develop its economy. As the conclusion, the equilibrium point of both game parts is not the optimal choice (not enter, {not raise interest rate, not raise interest rate}), but the reasonable Nash Equilibrium (enter, {raise interest rate, not raise interest rate}).

## 4. The Conclusion Analysis of Game between Hot Money and Central Bank

### 4.1. The Interest of Hot Money in the Game

It is because of the existence of the illegal private bank and the violation of some banks, foreign hot money pulled into china through various channels. There are two directions after hot money entered into China: One is commercial bank, which purses and gains interest from the appreciation of RMB and forms foreign money exacerbating liquidity; the other is housing and stock market, which purse the high profit of financial asset exacerbating liquidity of housing and stock market. Due to the hiddenness of the hot money, it is hard to find the specific amount money lies at which direction, but there is some reasonable guesses: compared to the first direction, the second direction will be more risk but also more profit, and combined with hot money's character of profit-chasing, we believe that hot money will be more in favor of the second direction with more risk, i.e. the pursuit of RMB-denominated financial assets is what hot money interested in.

### 4.2. The Interest of Central Bank in the game

Since 21st of July, 2005, China began to implement a managed floating exchange rate regime based on the market supply and demand, with reference to a basket of currencies. It is essentially a management-oriented, market-supplemented quasi-fixed exchange rate system limited by a small rage of fluctuation. With the Qualified Foreign Institutional Investors (QFII) and Qualified Domestic Institutional Investors (QDII) launched, it is easy for international capital to go in and out with increasing size of scale. Generally, China's capital flows should be classified as 'relatively mobility', and the slope of BP (balance of payments) curve is greater than the slope of LM (liquidity preference and money stock) curve. Therefore, 'fixed-exchange rate, i.e. capital controlled' mode is more applicable to analysis the effect of monetary policy as well as the impact of overseas hot money.

## 5. Strategies and Epilogues

According to the analysis outcome, we can take some positive measures to reduce the inflow of hot money overseas:

First, cut down the arbitrage space of hot money. Hot money has exacerbated the stock market, housing market and also formed bubbles in price, which low down national welfare. Therefore, the government should take effective measures to improve the asset pricing mechanism, which can make hot money arbitrage more difficult and costly.

Secondly, effective monitor should be taken to supervise the inflow of hot money. One is strict management of external debt, which focuses on the strengthening management over foreign-invested enterprises, corporate trade credit management, foreign debt borrowing and debt funds settlement supervision. The management builds up the system of corporate trade credit registration, which further improves the trade credit statistics monitoring. Another is to strengthen the management of foreign exchange registration of foreign direct investment. There should be a forbidden system to prevent illegal foreign investment enterprises to establish and register foreign money account. At the same time, a special account of FDI (Foreign Direct Investment) should be built to investigate the illegal use of foreign money and the examination of foreign money settlement according to the needs of different projects.

Thirdly, more strong efforts should be to investigate the illegal inflow funds. According to the requirement of State Council, the regulatory coordination mechanism should be improved in order to find abnormal foreign capitals; the examination of settlement should be deepening to track foreign money routes; cracking down the illegal private banks which as representative of all illegal foreign exchange activities.

Fourthly, take control of the formation mechanism and revolution pace of RMB exchange rate. Further enhancement should be implemented to add the flexibility of RMB exchange rate, which can lead foreign capital amounts and directions by using price leverage. At the situation of independent currency policy controlled, promoting the market-oriented reforms of exchange rate regime is the better choice, which can gain the initiative to adjust foreign exchange rate and make balance between gradual-progress and controllable.

China is in the period of economy rising, the inflow of hot money on the other side has affirmed the achievement of China's economic development. For the monetary authorities, control should be enhanced to supervise the two-way flow of international capital. As to the illegal inflow hot money, relevant legal measures should be taken and various functional departments should fulfill their respective regulatory responsibilities to crack down hot money through right and legal methods. If the hot money has posed a serious threat to the economy with no measures to cure, government should take extraordinary measures to prevent it. As the financial crisis continued to spread over the world, China is faced with a further reform of the financial system as well as the pressure from the opening-up to the outside world. They are also bound to comply with international rules and to realize the opening to the world financial areas. In this case, China must face the international hot money and to find the equilibrium point from the competitive game between two parts, which can effectively resist the illegal hot money.

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